

Primary productivity was extremely low in the first few meters of water beneath the ice, but increased appreciably as one approached the depth of the chemocline. Carbon-14 uptake apparently occurred below the chemocline also. High dark bottle carbon-14 uptake occurred frequently and at many depths. Preliminary laboratory studies of carbon-14 uptake by algal communities from Lake Bonney under temperature, light, and water chemistry conditions simulating those of the lake indicate that extremely high percentages of carbon-14-fixed extracellular organic matter are produced. This extracellular organic matter must be included in future estimates of production in this lake. In this connection, the dissolved organic matter in Lake Bonney constitutes an appreciable potential reservoir of substrate for dark or photo-assimilation.

We are grateful to our consultants for advice in interpreting our first field season's data and helping to redesign the coming second field season's research for optimum data collection. During the coming field season we plan to place some new emphasis on (1) benthic algal mat metabolism, (2) monitoring and tracing glacial meltwater inputs, (3) select aspects of sediment chemistry, (4) establishing further baseline data for the mathematical model and future pollution monitoring, and (5) primary productivity experiments aimed at photorespiration, extracellular product production and assimilation, etc.

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## Microbiology and immunology of south polar antigen deprivation

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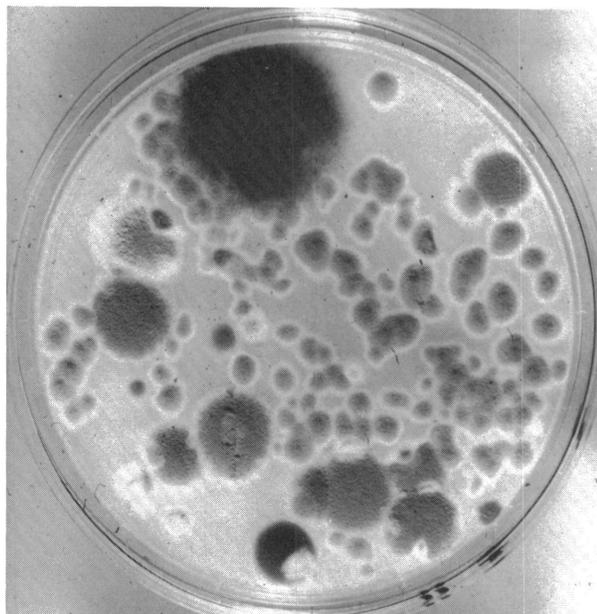
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This was the first formal field season for the microbiology and immunology portion of a new project, sponsored jointly by the Oklahoma Medical Research Foundation, the Veterans Administration Hospital, and the Departments of Psychiatry, Microbiology and Medicine (Infectious Disease Section), College of Medicine of the University of Oklahoma Health Sciences Center. The project is directed at a coordinated study of the biomedical aspects of human adaptation to complex south polar stresses.

Stateside baseline specimens were collected at Davisville, Rhode Island, naval base, and the Skyland, Virginia, U.S. Antarctic Research Program orientation program in September 1972. Specimens were collected at South Pole Station, McMurdo Station, and Christchurch, New Zealand, in October and November 1972, from volunteers recruited from the Naval and USARP personnel of the 1972 and 1973 wintering parties for South Pole Station. Data were collected personally by Dr. Muchmore, project director, assisted by Nan Scott and Lt. John E. Webster, U.S. Navy Medical Corps, at Davisville and Skyland, and by Lt. Mario Costaldi and Lt. Lynn Solem, U.S. Navy Medical Corps, at South Pole Station and McMurdo. All procedures were approved by the Committee on Human Experimentation of the University of Oklahoma Health Sciences Center, and informed consent was attested by individual signatures of volunteers.

This project grew out of the long standing polar legends concerning the good health of men during periods of prolonged polar isolation, with frequent respiratory infectious disease episodes following closely upon renewed social contact with persons residing outside the polar zones. Observation of neutropenia in serial leukocyte counts by Lt. A. B. Blackburn, U.S. Navy Medical Corps, during the 1967 Plateau Station winter season (Muchmore, 1970), and publications by Sladen (1965), Tikhomirov (1964), and Watanabe *et al.* (1967), plus a preliminary survey with interviews and samples taken at South Pole Station on a visit by Muchmore in November 1970, indicated the potential medical usefulness



A typical skin culture taken from the forehead of one of the South Pole Station personnel, using a Rodac plate. The culture medium is Sabouraud-dextrose agar with added antibiotics. There are two species of *Penicillium* and one of *Aspergillus*.

and the scientific importance of this information. Lt. J. M. Ryan, U.S. Navy Medical Corps, (physician at Pole Station, 1970) reported that *no* respiratory infections occurred in the 1970 winter party during the entire period of polar isolation (February to November). Yet 12 (75 percent) of the 16 respondents (from the 21-man party) reported acute post-polar respiratory infections in the 4 weeks immediately following contact with persons from "outside," an infectious disease rate well within the definition of "epidemic." This prolonged isolation from renewed contact with microbial flora from humans and animals, under conditions of natural environmental sterility, is unique to inland antarctic stations in contemporary human experience and affords remarkable opportunity to study many aspects of normal human immune processes in relation to infectious diseases unduplicated elsewhere.

Serial serum specimens collected before and throughout the February to November 1969 isolation period by Lt. R. A. Worley, U.S. Navy Medical Corps., were assayed for immunoglobulins IgA, IgM, and IgG. A decline of IgG and IgM ( $P < .05$ ) was found, while IgA concentrations did not change significantly (Muchmore *et al.*, in press). These serial serum specimens are the first group collected to provide pre-isolation baselines to compare with later specimens to detect sequential changes.

A large amount of fungal contamination was encountered on quantitative pharyngeal culture plates at Pole Station in November 1970. For this reason the investigation of molds in relation to polar personnel was begun in November 1972. Skin cultures from the forehead of each man were obtained. A typical culture plate (Sabouraud's dextrose agar) is shown in the figure. Thirty-one fungal isolations including eight species were recovered from the foreheads of twenty-three personnel from the 1972 and 1973 winters. These results are sum-

marized in the table. Testing of serums using *Aspergillus* antigens prepared from continental U.S. isolates shows three out of 91 serums contain *Aspergillus* antibody. This incidence appears to be higher than in state-side Oklahoma normals, but more extensive testing of serums from peer cohorts is required using antigens prepared from polar fungal isolates. These studies are in progress.

Throat swab samples for viral isolation were obtained from volunteering personnel with and without acute respiratory infections in the United States and again at South Pole Station and are now under study.

Some further preliminary information relative to the etiology of the acute respiratory infections is being obtained from nitroblue tetrazolium tests (NBT) performed in the United States, New Zealand, and again at Pole and McMurdo.

Finally, available sick call records at McMurdo and San Diego were reviewed and tabulated, documenting the minimum levels of occurrence of acute upper respiratory infections suffered by antarctic party personnel while in Antarctica, and these indicate that additional data collections will provide information of great interest on the nature and extent of post-polar acute respiratory infection episodes.

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## Occurrence of molds and yeast on foreheads of South Pole personnel, October-November 1972.<sup>a</sup>

Number of persons cultured	Mold or yeast isolated								
	<i>Aspergillus</i> sp.	<i>Aspergillus</i> sp.	<i>Candida</i> sp.	<i>Mucor</i> sp.	<i>Penicillium</i> sp.	<i>Penicillium</i> sp.	<i>Rhodotorula</i> sp.	<i>Saccharomyces</i> sp.	<i>Stemphylium</i> sp.
Pos/Total									
U.S. Navy	3	1	1	1	11	1	1	4	1
USARP	1	1	3	1	5	1	1	4	0
Total (24/36)	4	2	4	2	16	2	2	8	1

<sup>a</sup> Number of subjects from whom the fungus species was isolated. Cultures from several subjects yielded more than one fungus species.